Comparative phylogeographical study and molecular taxonomical analyses on the origins of cultivars and a natural hybridization in Hosta sieboldiana and Hosta albomarginata (Asparagaceae)

博 士 論 文 (要約)

Comparative phylogeographical study and molecular taxonomical analyses on the origins of cultivars and a natural hybridization in *Hosta sieboldiana* and *Hosta albomarginata* (Asparagaceae)

(オオバギボウシとコバギボウシにおける系統地理学的研究と栽培品種および自然交雑に関する分子分類学的研究)

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生態システム生命科学専攻

植物系統分類学分野

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Abstract

Aim

I focused on two *Hosta* species, *Hosta sieboldiana* and *H. albomarginata*, and try to elucidate several evolutionary phenomenon. First, I try to infer the phylogeographic history of herbaceous plants in the Japanese Archipelago. Second, I tried to elucidate the origins of some *Hosta* cultivars. Third, I tried to clarify that the hybridization between *H. sieboldiana* and *H. albomarginata* have occurred in natural populations.

Method

I analysed variations in chloroplast DNA (cpDNA) in the widespread herbaceous species *Hosta sieboldiana* and *H. albomarginata* across large portions of their geographic ranges in the Japanese Archipelago. SAMOVA, BARRIER and NJ tree were used to analyze extant patters of geographic distributions. These cpDNA haplotypes were also used to infer the origins of *Hosta* cultivars. To eludicate the hybridization between *H. sieboldiana* and *H. albomarginata*, I measured the morphological characters and genotyped the putative hybrids of two species by three SSR markers. The STRUCTURE and the NEWHYBRIDS were used to infer the population structure and the genetic composition of hybrid zones.

Resutls

The SAMOVA analysis revealed two clusters in *H. sieboldiana* and four clusters in *H. albomarginata* in the phylogeographic study. Two types of origins from *H. sieboldiana* and *H. albomarginata* were detected in the *Hosta* cultivars. The individuals mixed genotypes were identified by STRUCTURE and NEWHYBRIDS in the putative hybrid zone. Most of the putative are morphologically close to *H. albomarginata* although some of them have the cpDNA types of *H. sieboldiana*.

Main conclusions

Hosta sieboldiana and *H. albomarginata* may have experienced different distributional range shifts during the last glaciation. These results may be partially explained by the difference in ecological habitats and geographic distributions between the species. The phylogeographic history between Honshu and Hokkaido through Tsugaru Strait was similar in *H. sieboldiana* and *H. albomarginata.* New haplotypes were not detected in the cultivars, these might be originated from some populations that were not investigated in the previous study or mutations in the cultivars. There is a possibility that these haplotypes were originated from some populations that were not investigated in the previous study. The possibility that some mutations of the sequences have occurred in the cultivars after the breeding is also undeniable. Asymmetrical gene flow from *H. albomarginata* into *H. sieboldiana* might have occurred . The putative hybrids with the cpDNA haplotype of *H. albomarginata* might outlive individuals with the cpDNA haplotype of *H. sieboldiana* because the hybrid zone is likely to be preferable for *H. albomarginata*.